Water Quality Restoration Plan
Umpqua River Basin
South Umpqua Subbasin
Middle Cow Creek

Bureau of Land Management (BLM), Medford District Office

2004

Middle Cow Creek at a Glance

Hydrologic Unit Code (identification #)	1710030207
Watershed area/ownership	Total: 113,023 acres BLM Ownership: 44,577 acres (39%) Non-federal Ownership: 68,446 acres (61%)
Stream Miles assessed	Total: 4.1 miles
303(d) listed parameter	Temperature
Key Resources and uses	Salmonid, aesthetic, agricultural, domestic
Known Impacts (human)	Timber harvest, roads, mining, agriculture, rural residential and city of Glendale
Natural Factors	Varied geology, shallow soils, low water holding capacity resulting in low summer flows, east to west orientation

Statement of Purpose

This water quality restoration plan (WQRP) has been prepared to meet the requirements of Section 303d of the 1972 Federal Clean Water Act.

This plan covers land managed by the Bureau of Land Management (BLM) within the Middle Cow Creek watershed from Galesville reservoir on the mainstem of Cow Creek to the confluence of the West Fork Cow Creek.

The Oregon Department of Environmental Quality (DEQ) has lead responsibility for creating Total Maximum Daily Loads (TMDLs) and Water Quality Management Plans (WQMP) to address water quality impaired streams for Oregon. This WQRP will be provided to the DEQ for incorporation into an overall WQMP for the Cow Creek watershed. DEQ has a comprehensive public involvement strategy, which includes informational sessions, mailings, and public hearings. The BLM will provide support and participate in this public outreach.

Legal Authorities to be Used

Clean Water Act Section 303(d)

Section 303(d) of the Federal Water Pollution Control Act (Clean Water Act (CWA)) as amended in 1977, requires states to develop a list of rivers, streams, and lakes that cannot meet water quality standards without application of additional pollution controls beyond the existing requirements on industrial sources and sewage treatment plants. Waters that need this additional help are referred to as "water quality limited" (WQL). Water quality limited waterbodies must be identified by the Environmental Protection Agency (EPA) or by a delegated state agency. In Oregon, this responsibility rests with the DEQ. The DEQ updates the list of water quality limited waters every two years. The list is referred to as the 303(d) list. The CWA section 303 further requires that TMDLs be developed for all waters on the 303(d) list. A TMDL defines the amount of pollution that can be present in the waterbody without causing water quality standards to be violated. A WQMP is developed to describe a strategy for reducing water pollution to the level of the TMDL, which will restore the water quality and result in compliance with the water quality standards.

Northwest Forest Plan

Federal land management is guided by the Northwest Forest Plan (NFP) which, although not law, creates a system of reserves to protect a full range of species and their habitats. Biological objectives of the NFP also include assurances that adequate habitat will be retained to aid in the “recovery” of late-successional forest habitat-associated species and prevention of species from being listed under the Endangered Species Act (ESA). The Aquatic Conservation Strategy (ACS) is an essential component of the NFP which ensures stream, lake, and riparian protection on Federal lands.

ACS Objectives. The ACS was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within USFS and BLM lands within the range of the northern spotted owl. The strategy seeks to protect salmon and steelhead habitat on lands within the range of Pacific Ocean anadromy.

The ACS strives to maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian-dependent species and resources and restore currently degraded habitat. This approach seeks to prevent further degradation and restore habitat over broad landscapes. Because it is based on natural disturbance processes, it is recognized that it may take a decade to accomplish all ACS objectives. Some improvements in aquatic ecosystems, however, can be expected in 10 or 20 years.

Middle Cow Creek

Water Quality Restoration Plan 2003

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Middle Cow Creek
Watershed Analysis

Summary

MORPHOLOGY	
Geographic Province	Klamath mountains
Watershed size	113,023 acres
Elevation range	1,029 - 5,103 feet
Drainage pattern	dendritic
Total streams	1,339 miles
Drainage density	7.6 miles/square mile
Sixth-field watersheds	Whitehorse 21,930 acres Quines 18,292 acres Fortune Branch 13,870 acres Windy 15,688 acres McCullough 13,865 acres Langdon 15,735 acres Riffle 13,643 acres Total 113,023 acres
METEOROLOGY	
Annual precipitation	36 - 70 inches;the highest amounts on the western edge
Precipitation Timing	80% occurring October thru May
Temperature range	0-100 degrees F
SURFACE WATER	
Minimum flow	1.0 cfs during several summers. Many stream segments were dry during summer months; the main stem Cow Creek is now regulated by Galesville Dam
Maximum peak flow	10,600 cfs on 1/15/74 at Cow Cr. near Azalea - now regulated by Galesville Dam
Reservoirs	Galesville Reservoir upstream, just outside watershed Numerous small private ponds

Water quality limited streams	About 90.0 miles (listed for temperature above 64 degrees) Mouth to headwaters except Cow Creek. <u>Sixth field water quality limited streams:</u> Woody Creek — Quines Creek Windy Creek — Riffle Creek Dad's Creek — Skull Creek Fortune Branch — Cow Creek (W. Fork Cow up Woodford Creek — to Quines Creek)
GEOLOGY	
Geologic Type	Marine volcanic, metamorphic sedimentary and ultra-mafic rock (typical of Klamath Mountains province).
Soils	Shallow depth, many different series and complexes. Generally very low water holding capacity, relatively infertile.
BIOLOGICAL	
Vegetation	Primarily mixed evergreen; conifers and hardwoods. Vegetative communities differ by slope, aspect, elevation and soils.
Total fish streams	154 miles
Candidate, threatened, or endangered species	Spotted owl: 35 active sites; 18 100-acre core areas Marbled murrelet: west half of watershed within 50 miles of coast (none found) Bald eagles fish: Oregon Coast coho salmon
Survey and Manage species	Fungi, del Norte Salamander, mollusks, bryophytes, lichens and red tree vole
Special Status Plants	Numerous species and locations
HUMAN INFLUENCE	
Counties	Douglas Josephine (very small portions along southern boundary) Jackson (very small portions along southwest boundary)
Roads	811 miles
Road density	4.6 mi./square mile
Streams within one tree length of roads	707 miles
Fish Streams within one tree length roads	143 miles
Timber production	GFMA - 18,392 acres gross - 9,237 acres outside all reserves Major BLM timber component is large, mature and old growth trees.
Utility corridors	Natural gas line, fiber optics line, electric power line, railroad.

Communities	Glendale, Azalea, Quines Creek, numerous residents in valleys		
PUBLIC LANDS			
BLM Medford lands	44,577 acres (39 %) + 1065 acres BLM Roseburg (1%)		
	BLM Medford Land Use	**Acres**	**(Percent)**
	Late-successional Reserves/1	20,366	45
	Connectivity/Diversity Blocks	6,679	15
	General Forest Mgmt. Area/2	18,392	40
	Recreation Site	30	0
	Total	45,577	100
State of Oregon lands	7,276 acres (6)		

Introduction

This document is prepared to comply with the Environmental Protection Agency requirements. This WQRP is the overall framework describing the management efforts to protect and enhance water quality on federal lands in the Middle Cow Creek watershed.

This document will detail the extent that federal actions may contribute to changes in water temperature as well as outline efforts to protect and enhance water quality on federal lands in this watershed.

The WQRP will include the following elements:

1. Condition assessment and problem description
2. Resource Considerations
3. Limiting Factor Analysis
4. Goals and objectives
5. Timeline for implementation, cost, funding
6. Responsible Parties
7. Reasonable Assurance of Implementation
8. Monitoring/Evaluation Plan
9. Public Participation Plan

Element 1: Condition assessment and problem description

Table 1. Land Ownership in the Middle Cow Creek watershed.

Ownership/Land Use	Acres	Percent of Middle Cow Creek watershed
Medford BLM	44,577	39
Roseburg BLM	1,065	1
Oregon State	7,276	6
Local Government	147	0
Private Timber Industry	40,519	36
Private Forest: Non-industry	13,206	12
Agricultural (Pasture land)	5,302	5
Residential	929	1
Total	113,023	100

Several streams in the Middle Cow Creek Watershed have a history of placer mining. Riparian vegetation has been removed as a result of mining and past logging practices. Natural vegetation along the floodplains consisted of Oregon ash, maple, willows, and cottonwood with a small portion of conifers where disturbance has not occurred over the last 100 years. The channels in the areas of active placer mining are unstable and will continue to erode until riparian vegetation is reestablished and uplands become vegetated. Major floods occurred in 1964 and 1974 which reduced riparian vegetation to little more than some willow clumps along the mainstem of Middle Cow Creek. From Starveout Creek to the town of Glendale a flood plain has developed and remains unstable due to continued meandering and bank readjustment during high water events.

APPLICABLE WATER QUALITY STANDARDS

Beneficial Uses

Oregon Administration Rules (OAR 340–41–322) list the designated beneficial uses for Umpqua River waters. The specific beneficial uses occurring in the Middle Cow Creek watershed are presented in Table 2.

Table 2. Beneficial uses in the Middle Cow Creek Watershed

Beneficial Use		***Beneficial Use***	
Public Domestic Water Supply	✓	Anadromous Fish Passage	✓
Private Domestic Water Supply	✓	Salmonid Fish Spawning	✓
Industrial Water Supply	✓	Salmonid Fish Rearing	✓
Irrigation	✓	Resident Fish and Aquatic Life	✓
Livestock Watering	✓	Wildlife and Hunting	✓
Boating	✓	Fishing	✓
Aesthetic Quality	✓	Water Contact Recreation	✓
Commercial Navigation & Trans.		Hydro Power	✓

The Oregon Environmental Quality Commission has adopted numeric and narrative water quality standards to protect designated *beneficial use*s. In practice water quality standards have been set at a level to protect the most sensitive uses. Seasonal standards may be applied for uses that do not occur year round. Cold-water aquatic life such as salmon and trout are the most sensitive *beneficial uses* in the Middle Cow Creek watershed.

The Clean Water Act of 1972 as amended by the Water Quality Act of 1987, provides direction for designated beneficial uses. DEQ is responsible for developing a list of streams that fail to meet established water quality criteria for one or more beneficial uses. These designated streams are often referred to on the state's 303(d) list. Water quality monitoring throughout Middle Cow Creek has resulted in 303d listings for about 90 miles of streams that have failed to meet established criteria for one or more beneficial uses. See Table 3 (Map 1).

Table 3. Water quality limited streams in the Middle Cow Creek watershed from mouth to headwaters.

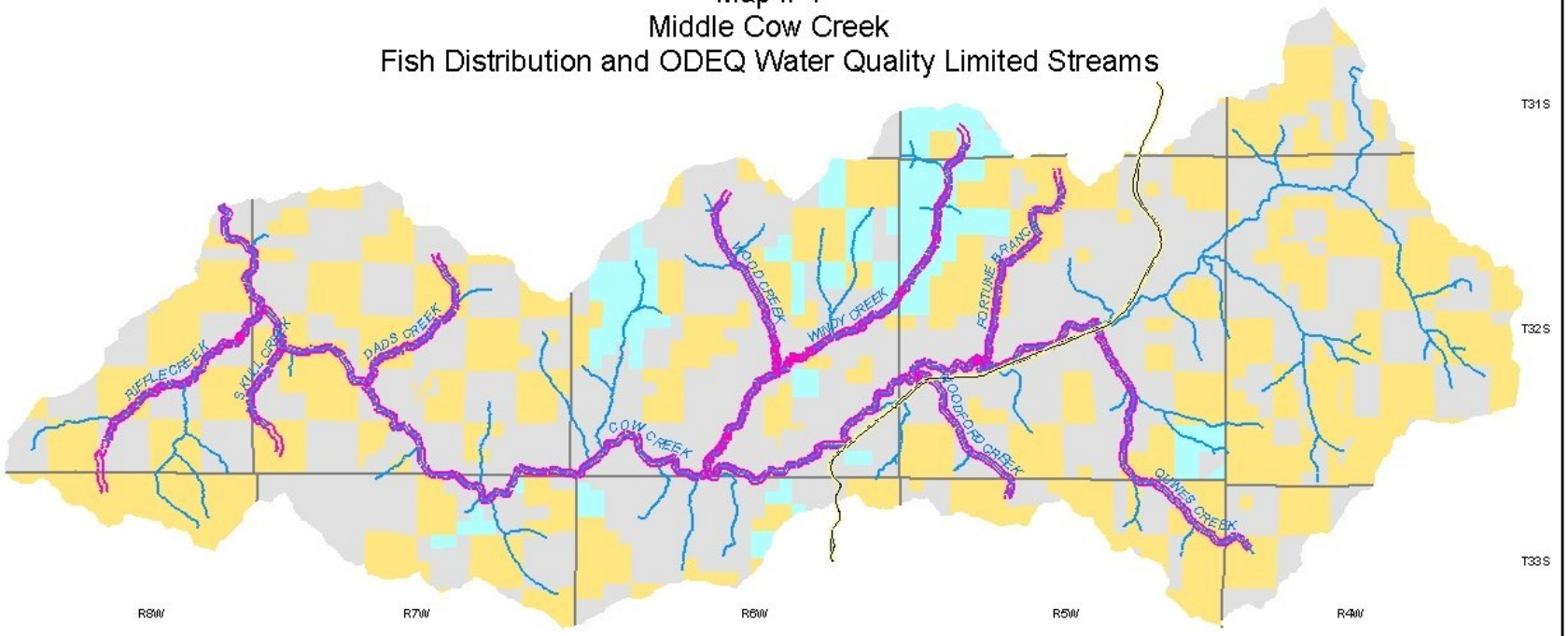
Stream	Water Quality Parameter
Wood Creek	Temperature
Windy Creek	Temperature
Dad's Creek	Temperature
Fortune Branch	Temperature
Quines Creek	Temperature
Riffle Creek	Temperature
Skull Creek	Temperature
Woodford Creek	Temperature
Cow Creek (W. Fk. Cow up to Quines Cr)	Temperature
Note: Cow Creek below West Fork Cow Creek is also limited by Temperature, Habitat Modification and pH. This stream reach is outside the Middle Cow Creek watershed.	

*see Map #6 and Table 9 for BLM specific segments

Chinook and coho salmon and summer and winter steelhead are known to spawn in the creeks during higher flow periods. Cutthroat trout are also present in most of the tributaries and the mainstem. Mining, timber harvest, agriculture and rural residential development all contribute to less than optimal conditions for fish habitat within this watershed.

Streams listed for temperature do not meet the criteria (e.g., the rolling 7 day average of the daily maximum temperature) for anadromous fish rearing (e.g., temperature exceeds 64 degrees). This also applies to the resident fish and other aquatic life, particularly resident cutthroat, which are present in these streams (Map 1).

Map # 1
Middle Cow Creek
Fish Distribution and ODEQ Water Quality Limited Streams



3 1.5 0 3 6 Miles

Legend

- Interstate 5
- Water Quality limited streams
- Streams with fish
- Township lines

Ownership
- BLM
- State
- Other

N W E S

Creation Date: 5/27/2003

Table 4 lists historic and present condition information about elements that may affect temperature on Middle Cow Creek.

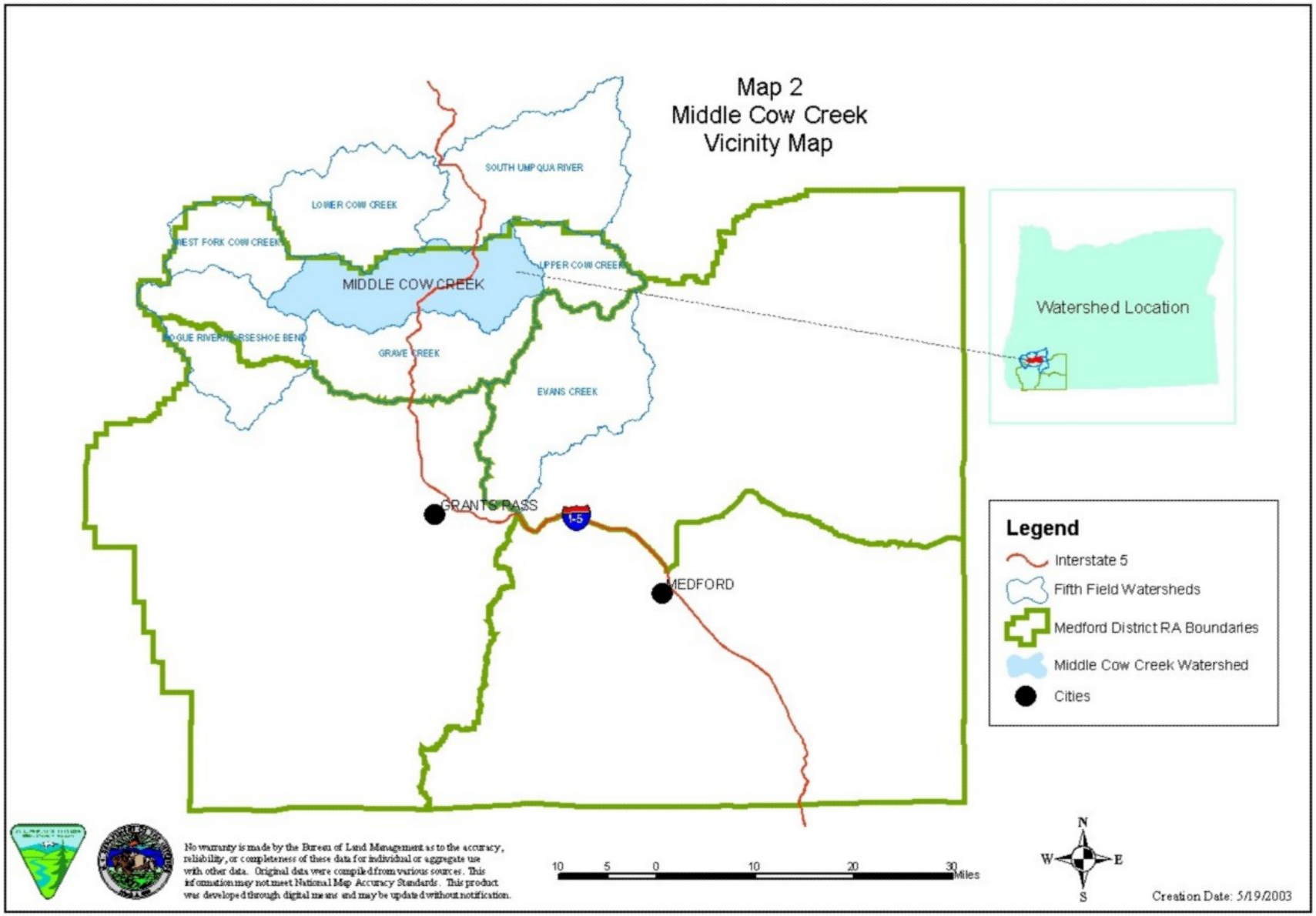
Table 4. Historic and current conditions of selected elements.

Riparian Vegetation	
Historical Condition	• Late seral vegetation dominant prior to 1850's when mining initiated riparian clearing.
Present Condition	• Early to mid seral vegetation dominant in low lands mainly resulting from mining and agriculture, primarily of harwood species (on going placer mining keep riparian vegetation at early seral stage)
Forest Health & Productivity	
Historical Condition	• Frequent, low intensity fires maintained low fuel levels and open under-story
Present Condition	• Fire exclusion resulting in high fuels • Much of harvested lands are densely planted and overstocked (increased competition) • Soil compaction due to tractor harvest
Roads	
Historic Condition	• Few roads before industrial timber harvesting began in the early 1950's
Present Condition	• High road density (near 5.0 mi/mi^2) • Road placement often occurs in riparian areas • High number of stream crossings • Stream network extension (due to ditch lines) increases frequency of 5 and 10 year flood regimes
Flow Regime	
Historic Condition	Low flows of 1 cfs have been recorded by USGS gaging station.
Present Condition	Mainstem flows are augmented during summer by releases from Galesville Reservoir.

Element 2: Resource Considerations

Middle Cow Creek is a 113,023 acre watershed that is tributary to the South Umpqua River in Southwest Oregon.

The Middle Cow Creek Watershed is a fifth-field watershed in the Klamath Mountains province, located in southwest Oregon, approximately 20 miles north of Grants Pass (Map 2).


Map 2
Middle Cow Creek
Vicinity Map
SOUTH UMPQUA RIVER
LOWER COW CREEK
WEST FORK COW CREEK
MIDDLE COW CREEK
UPPER COW CREEK
ROGUE RIVER/HORSESHOE BEND
GRAVE CREEK
EVANS CREEK
GRANTS PASS
I-5
MEDFORD
Watershed Location
Legend
Interstate 5
Fifth Field Watersheds
Medford District RA Boundaries
Middle Cow Creek Watershed
Cities
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10 5 0 10 20 30 Miles
N
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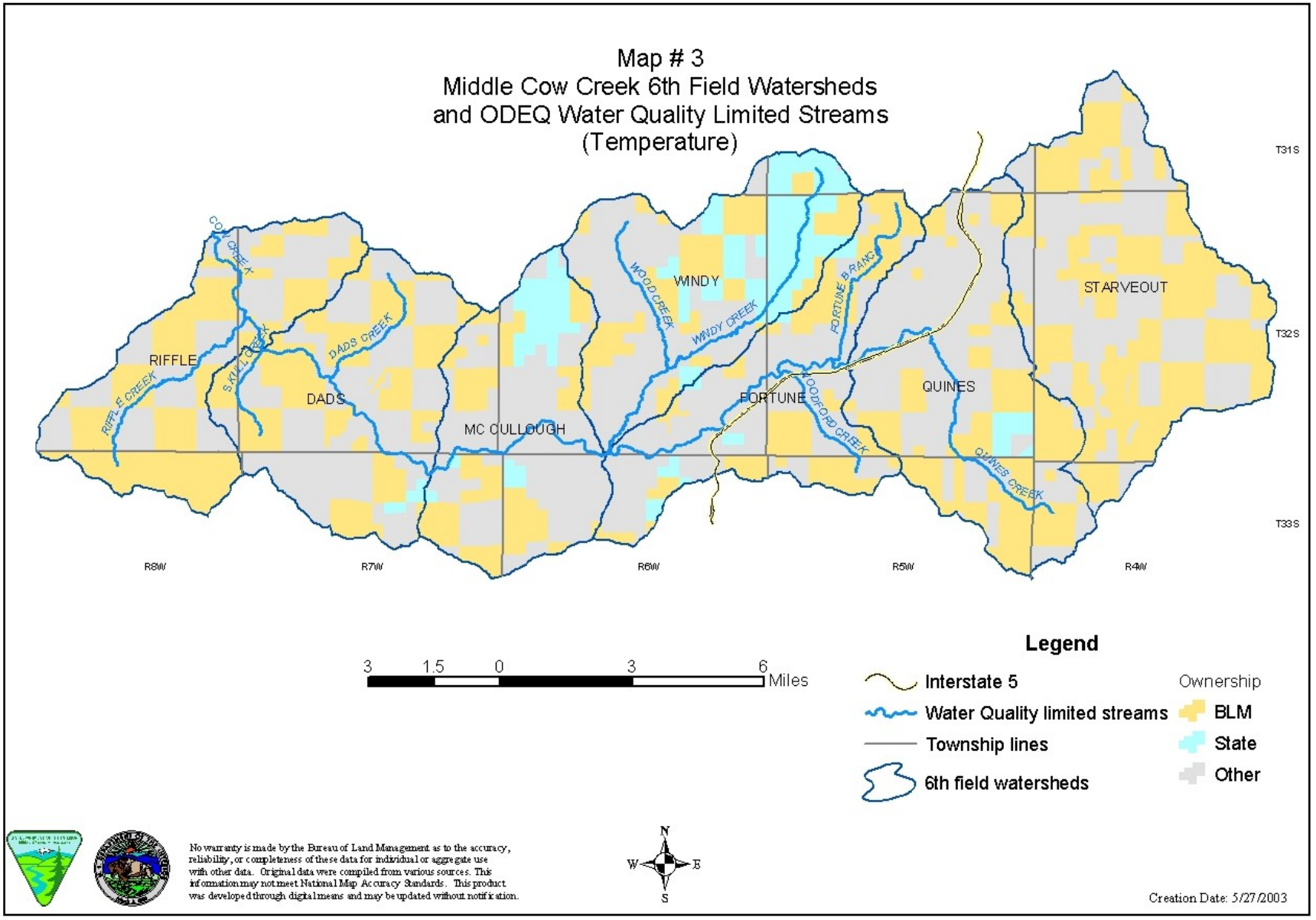
Creation Date: 5/19/2003

BLM administers about 45,600 acres (45 percent) of the watershed. Within the Middle Cow Creek watershed, the town of Glendale and the communities of Azalea and Quines Creek are the major communities in the watershed. There are residential areas located along most major tributaries of mainstem Cow Creek within the watershed.

Major tributaries of Middle Cow Creek include Whitehorse Creek, Quines Creek, Windy Creek, Rattlesnake Creek and Dads Creek. The watershed has been divided into seven sixth-field watersheds (Table 5) and 73 seventh-field watersheds ranging from about 6 acres to about 4,300 acres. These include a series of small unnamed creeks which drain directly into Middle Cow Creek. Annual precipitation in the watershed averages about 45 inches. Extended summer drought is common. (Map 3).

Table 5. Sub-watersheds within the Middle Cow Creek watershed.

Sixth-field watershed		Acres	Percent of Middle Cow Creek watershed
Whitehorse	(CM01)	21,930	19
Quines	(CM02)	18,292	16
Fortune Branch	(CM03)	13,870	12
Windy	(CM04)	15,688	14
McCullough	(CM05)	13,865	12
Langdon	(CM06)	15,735	14
Riffle	(CM07)	13,643	12
Total		113,023	100


Map # 3
Middle Cow Creek 6th Field Watersheds
and ODEQ Water Quality Limited Streams
(Temperature)
T31S
T32S
T33S
R8W
R7W
R6W
R5W
R4W
RIFFLE
DADS
MC CULLOUGH
WINDY
FORTUNE
QUINES
STARVEOUT
COW CREEK
SKULL CREEK
DADS CREEK
RIFFLE CREEK
WOOD CREEK
WINDY CREEK
FORTUNE BRANCH
GOODFORD CREEK
QUINES CREEK
3 1.5 0 3 6 Miles
Legend
Interstate 5
Water Quality limited streams
Township lines
6th field watersheds
Ownership
BLM
State
Other
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
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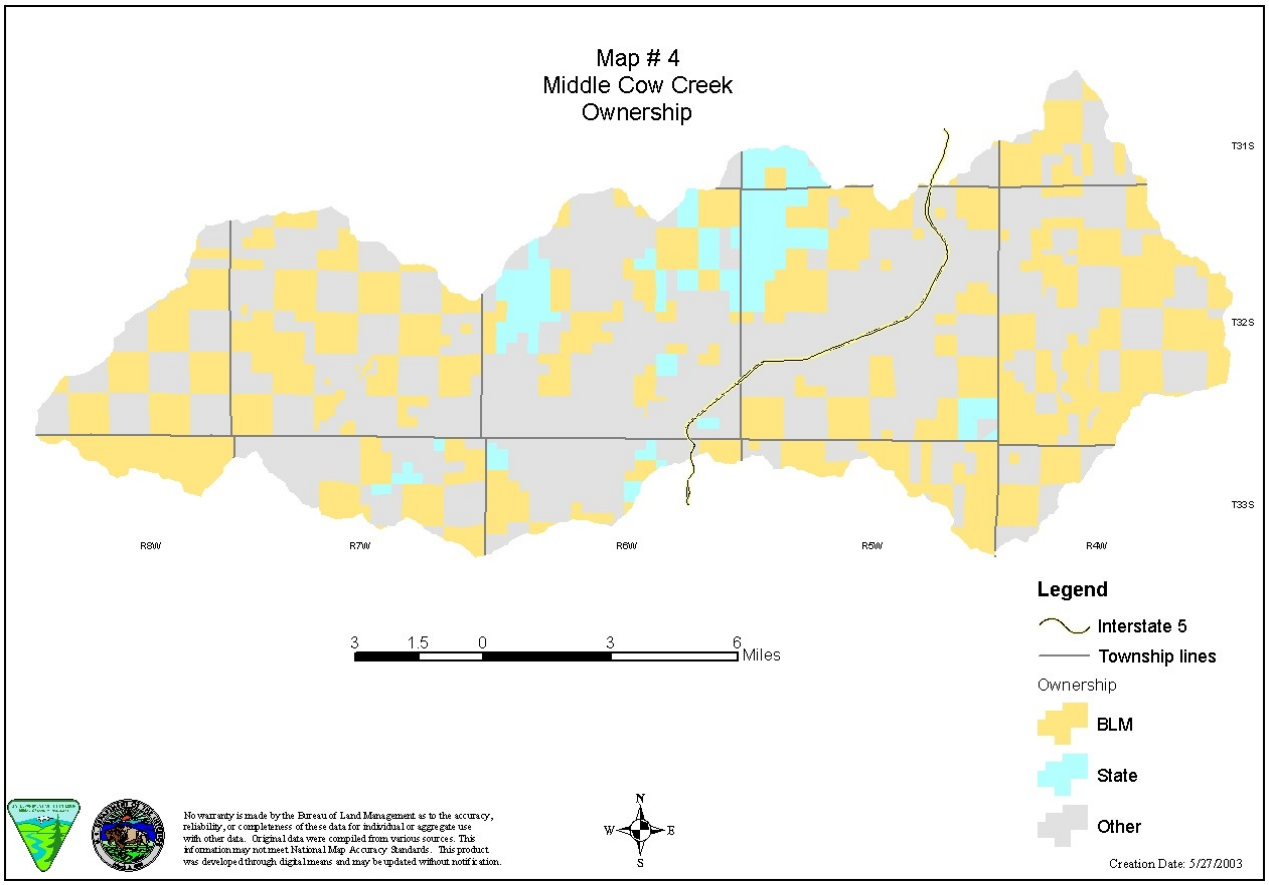
Creation Date: 5/27/2003

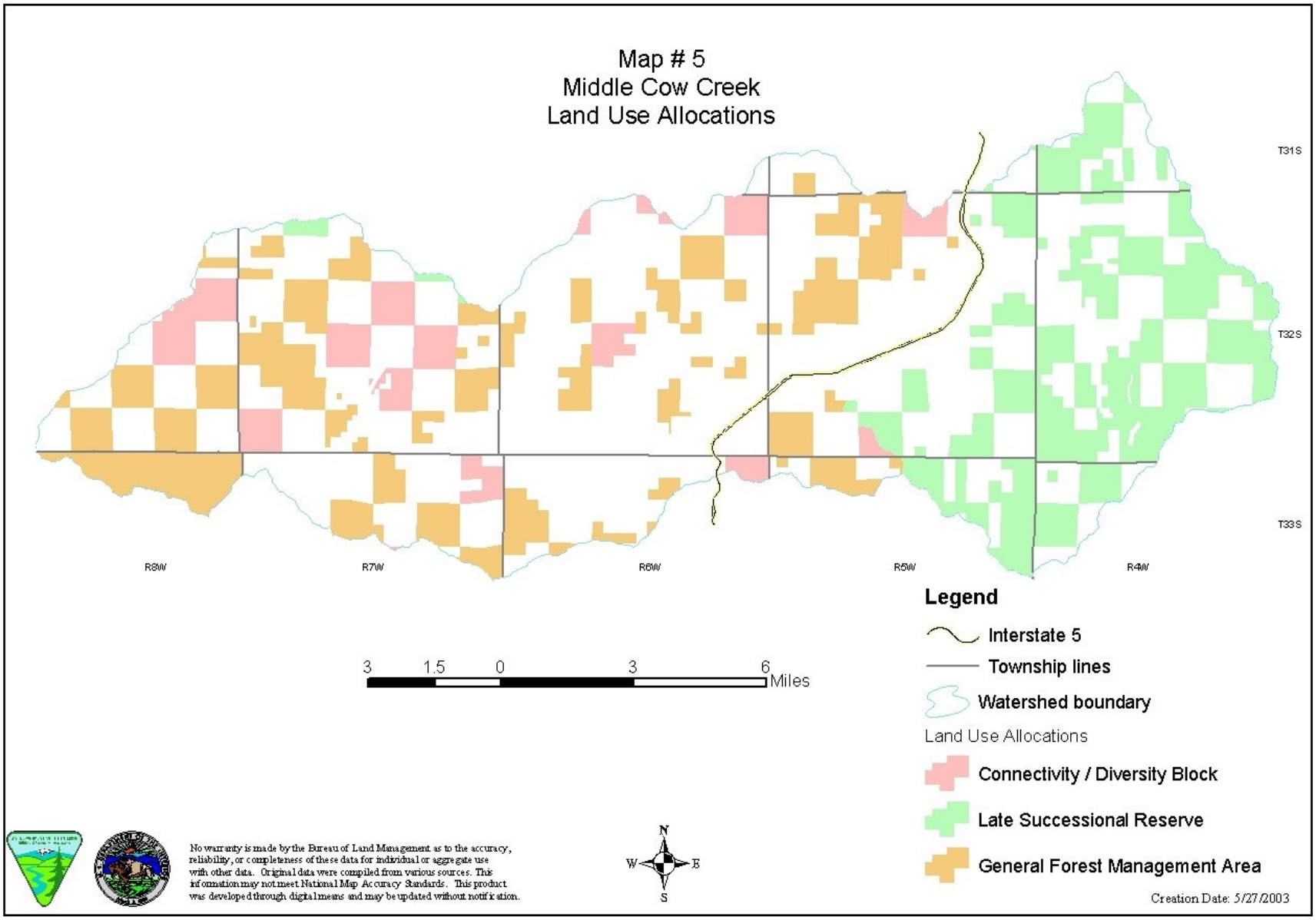
Soils in the unit are derived from metasedimentary and metavolcanic rock types. Soils associated with metasedimentary rocks tend to be deeper and have more nutrients available. Soils developed from metavolcanic rock types tend to be shallow and have less soil nutrients and soil development than the sedimentary. Organic matter plays an increasing role in the productivity of the metavolcanic sites. Some of the unit is dominated by serpentine-derived soils which are low in calcium and high in magnesium and other minerals which produce unique vegetative communities, and preclude many plant species which are adapted to calcium-based soils. These soils are found in upper Whitehorse, Quines and Starveout Creeks.

Federal lands are intermingled with non-federal lands in a "checkerboard" pattern characteristic of much of the Oregon and California (O & C) railroad lands of Western Oregon (Table 1) (Map 4).

Land Use Allocations

The Medford District Resource Management Plan (RMP) designated several land use allocations for federal lands within the watershed. These allocations provide overall management direction and varying levels of resource protection (Map 5).




Map # 5
Middle Cow Creek
Land Use Allocations
T31S
T32S
T33S
R8W
R7W
R6W
R5W
R4W
3 1.5 0 3 6 Miles
Legend
Interstate 5
Township lines
Watershed boundary
Land Use Allocations
Connectivity / Diversity Block
Late Successional Reserve
General Forest Management Area
Creation Date: 5/27/2003
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Late-successional reserves (LSRs) are areas designated in the RMP where the major management objective is to maintain or promote late-successional and old growth habitat. In this watershed there is only a small part of a large LSR which is located to the west, and 15 spotted owl core areas of about 100-acres each.

Connectivity/Diversity blocks are generally square mile sections in which at least 25 to 30 percent of each block will be maintained in late-successional conditions. They are designed to promote movement of species associated with late-successional habitat across the landscape and add richness and diversity to the land outside LSRs. There are portions of nine of these Connectivity/Diversity blocks in the watershed.

The General Forest Management Area (GFMA) is the allocation where timber harvest is a primary objective. All of the Middle Cow Creek Watershed falls into the northern GFMA, where the RMP calls for retaining at least 6-8 large trees per acre in regeneration harvests.

Table 6. Federal Land Use Allocations within the Middle Cow Creek Watershed.

Land Use Allocation	Acres	(Percent)
Late-successional Reserves/1	20,366	45
Connectivity/Diversity Blocks	6,679	15
General Forest Mgmt. Area/2	18,392	40
Recreation Site	30	0
Total	45,510	100

/1 Late-successional reserves include portions of large LSR and 100 acre spotted owl core areas.
/2 General forest management area includes acres of riparian zones that are withdrawn from entry (see map 5). This constitutes about 40 percent of the GFMA.

Section 303(d)(1) of the Clean Water Act requires that TMDL "be established at a level necessary to implement the applicable water quality standard with seasonal variations." Both stream temperature and flow vary seasonally and from year to year. Water temperatures are cool during the winter months, and only exceed the State standard between the summer months of June and September when stream flows are lowest and solar radiation is the highest. Table 7 lists the site locations where BLM monitoring has occurred. Stream temperatures exceed the standard in the Middle Cow Creek watershed during some periods between June and September for five years of record (1995-2000). Data from 1994 were not used for calculating the 7-day high for the period of record since that period was during a drought.

Table 7. Temperature Monitoring Locations and years monitored

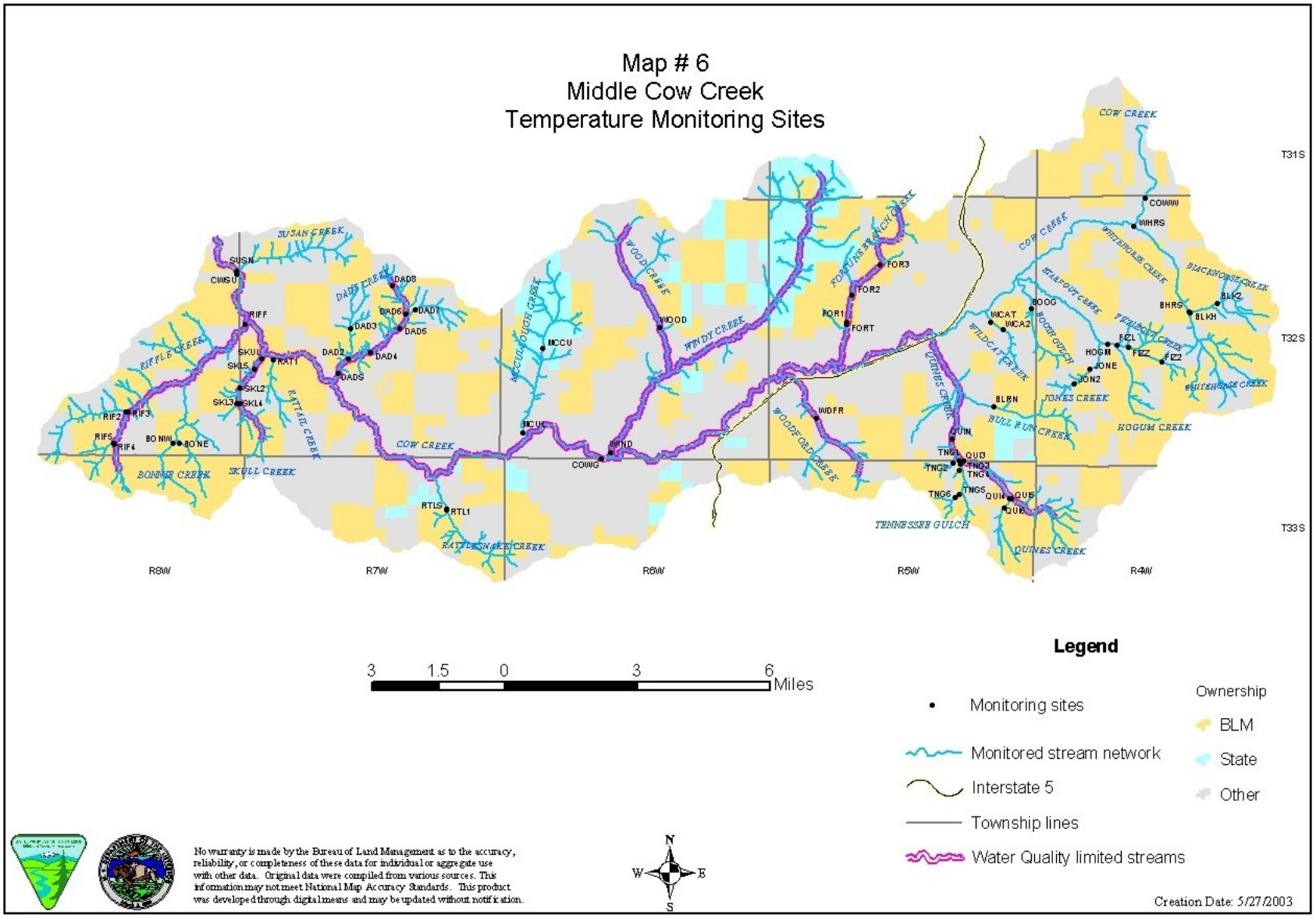
* indicates temp during a drought year (2001 or 2002)

Site ID	Site Location Description	Highest 7 day temp for period of record	1994	1995	1996	1997	1998	1999	2000	2001	2002
BHRS	Blackhorse Creek @ confluence with Whitehorse Creek	60.4				X					
BLKH	Blackhorse Creek above confluence with Whitehorse Creek	61.2*								X	X
BLK2	Blackhorse Creek @ BLM/private border in 32-4-14	64.2*								X	X
BLRN	Bull Run Creek @ 32-5-25/26 line	58.8*								X	X
BONE	Bonnie Creek East Fork above confluence with West Fork	61.2	X	X	X						
BONW	Bonnie Creek West Fork above confluence with East Fork	63.7	X	X	X						
BOOG	Booth Gulch @ BLM/private border of 32-5-13	60.3*								X	X
COWG	Cow Creek @ Glendale, @ lower bridge below Windy Creek	70.9		X	X						
CWSU	Cow Creek above Susan Creek	78.7	X	X	X						
COWW	Cow Creek above Whitehorse Creek @ USGS Gaging Station	64.4	X	X	X						
DADS	Dads Creek above confluence with Cow Creek @ Cow Creek Rd.	66.2	X	X	X	X	X	X	X		
DAD2	Dads Cr unnamed trib on rd 32-7-21.1 below culvert near confl. w/ Dads Cr.	61					X				
DAD3	Dads Cr. unnamed trib on road 32-7-21.1 on section 21/16 border @ 1550'	62.7					X				
DAD4	Dads Creek @ 1530' elevation	65.4					X		X		
DAD5	Dads Creek above Ping Gulch @ 1560' elevation	65.7					X	X	X		
DAD6	Dads Creek unnamed trib on road 32-7-15.1	69.8					X	X	X		

Site ID	Site Location Description	Highest 7 day temp for period of record	1994	1995	1996	1997	1998	1999	2000	2001	2002
DAD7	Dads Creek @ 1680' elevation	61					X	X	X		
DAD8	Dads Creek @ 32S 7W 10/15 section border; on road 32-7-15.1	60.4						X	X		
FIZZ	Fizzleout Creek @ BLM/private border in 32-4-21	62.9								X	X
FIZL	Fizzleout Creek above Hogum Creek confluence	59	X								
FIZ2	Fizzleout Cr.@BLM 32S-4W-21/22 line	57.8								X	X
FOR1	Fortune Branch Creek @ Culvert Sec. 17 - ~3/4 mi upstream of 1995 site	63	X								
FORT	Fortune Branch Creek @ Road 32-5-20 crossing (SE1/4 Sec. 17)	66.9		X	X	X	X	X			
FOR2	Fortune Branch Creek above culvert on road 32-5-17 (SE NE)	63.2					X	X			
FOR3	Fortune Branch Creek above culvert on road 32-5-09	62					X				
HOGM	Hogum Creek above confluence with Starvout Creek	62.4		X	X	X					
JONE	Jones Creek @ BLM/private line in 32-4-29	60.1*								X	X
JON2	Jones Creek @ 32-4-29/30 line	60.7*								X	X
MCCU	McCullough Creek #1 @ 1780' elevation	62.4					X				
MCUL	McCullough Creek above confluence with Cow Creek	63				X					
QUIN	Quines Creek @ lower BLM line, Section 35	66.3	X	X	X		X				
QUI3	Quines Creek #3 @ 1960' elevation (T:33S R:05W S:02 NW NE)	66.4					X	X	X	X	X
QUI4	Quines Cr. #4 @ 2310' elevation, abv confluence w/ unnamed trib in Sec. 1	64.4					X	X	X	X	X
QUI5	Unnamed trib to Quines Cr, @ 2300' elevation in Sec. 1 SE1/4 SW1/4	63.8					X		X	X	X

Site ID	Site Location Description	Highest 7 day temp for period of record	1994	1995	1996	1997	1998	1999	2000	2001	2002
QUI6	Quines Creek #6 @ road 32-5-35.2 crossing; 33S 5W 01/12 section border	58						X	X		
RAT1	Rattail Creek above Cow Creek road	63.6							X	X	X
RIFF	Riffle Creek @ confluence with Cow Creek	70.8	X	X	X				X		
RIF2	Riffle Creek @ BLM/private boundary (near RIF3)	65.9							X	X	X
RIF3	Riffle Creek tributary @ BLM/private boundary (near RIF2)	59							X		
RIF4	Unnamed trib to Riffle Creek @ 1990' elevation	62.2*								X	X
RIF5	Riffle Creek @ 32-8-33/34 line	56.5*								X	X
RTLS	Rattlesnake Creek above Stevens Creek (Cow Creek)	63.8		X	X						
RTL1	Rattlesnake Creek above Stevens Creek (Cow Creek)	66.9	X								
SKUL	Skull Creek near confluence with Cow Creek	68.5	X	X	X		X	X	X	X	X
SKL2	Skull Creek (#2) @ Section 25/30 line	65.1*					X	X	X	X	X
SKL3	Unnamed trib (#3) to Skull Creek @ 1380' elevation	62.8					X	X	X	X	X
SKL4	Skull Creek #4, @ 1380' elevation, above unnamed trib. in Sec. 25 SE	63.4					X	X	X		
SKL5	Skull Cr @32-7-30/19 line, NE of NW 1/4	66								X	X
SUSN	Susan Creek @ confluence with Cow Creek	70							X	X	X
TNGL	Tennessee Gulch above confluence with Quines Creek	64.4					X	X			
TNG2	Unnamed trib(#2) to Tennessee Gulch @ sect. 35/02 border on road 32-5-35	63.6						X			
TNG3	Tennessee Gulch below meadow/beaver pond on road 33-5-2	67.5						X			
TNG4	Tennessee Gulch above meadow/beaver pond on road 33-5-2	61.9						X			

Site ID	Site Location Description	Highest 7 day temp for period of record	1994	1995	1996	1997	1998	1999	2000	2001	2002
TNG5	Tennessee Gulch @ end of rd 33-5-2; mainstem at confluence w/ other fork	59.7						X			
TNG6	Tennessee Gulch @ BLM/private boundary in 33S 5W 02	57.9						X			
WCAT	Wildcat Creek @ 32-5-13/14 line	55.7*								X	X
WCA2	Wildcat Creek @ 32-5-13/24 line	59.6*								X	X
WDFR	Woodford Creek @ Mountain Grove	65.3		X							
WHRS	Whitehorse Creek @ Cow Creek confluence	64.8	X	X	X	X					
WIND	Windy Creek near Cow Creek confluence, @ Glendale High School	67.4	X	X	X	X					
WOOD	Wood Creek one mile above confluence with Windy Creek	65.5	X	X	X						


Map # 6
Middle Cow Creek
Temperature Monitoring Sites
T31S
T32S
T33S
R8W
R7W
R6W
R5W
R4W
COW CREEK
SUSAN CREEK
DAVIS CREEK
RIFFLE CREEK
RATTAIL CREEK
BONNER CREEK
SKULL CREEK
WOOD CREEK
WINDY CREEK
MCCULLOUGH CREEK
FORTUNE BRANCH CREEK
WOODS GULCH CREEK
QUINES CREEK
WILDCAT CREEK
BULL RUN CREEK
JONES CREEK
HOGUM CREEK
WHITEHORSE CREEK
BLACKHORSE CREEK
SEABOOT CREEK
TENNESSEE GULCH
RATTLESNAKE CREEK
SUSN
CMSU
RIFF
SKUL
SKL5
RAT1
SKL2
SKL3
SKL4
RIF2
RIF3
RIF5
RIF4
BONW
BONE
DAD8
DAD6
DAD1
DAD3
DAD5
DAD2
DAD4
DADS
MCCU
MCUL
COWG
WOOD
WIND
FOR3
FOR2
FOR1
FORT
WDFR
RTLS
RTL1
COWW
WHRS
BHRS
BLK2
BLKH
BOOG
WCAT
WCA2
FZL
FEZ
FEZ2
HOGM
JONE
JON2
BLRN
QUIN
TNG1
QUI3
TNG2
TNG3
TNG4
TNG6
TNG5
QUI4
QUI5
QUI6
3
1.5
0
3
6
Miles
Legend
Monitoring sites
Monitored stream network
Interstate 5
Township lines
Water Quality limited streams
Ownership
BLM
State
Other
N
W
E
S
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
Creation Date: 5/27/2003

Element 3: Limiting Factor Analysis

Within GFMA lands there are acres which have been withdrawn from intensive timber harvest. The majority of these acres were withdrawn due to rocky soils which preclude successful replanting. In addition to these land allocations, there are also several other important designations that occur within the watershed. BLM manages approximately 40 percent of the watershed. Less than 30 percent of the water quality limited stream miles within this watershed occur on BLM. Most of the streams are listed for temperature from the mouth to the headwaters, but in many cases the location of the monitoring site was at the mouth.

Analysis of water quality limited streams in Middle Cow Creek

Table 8 shows the approximate percentage of stream lengths administered by federal and non federal entities.

Table 8. Percent of Middle Cow Creek Streams on Federal vs. Non-Federal Land

Stream	Approximate Percentage of Streams on Non-Federal Land	Approximate Percentage of Streams on Federal Land
Windy Creek	95	5
Wood Creek	99	1
Fortune Branch	25	75
Quines Creek	75	25
Riffle Creek	80	20
Skull Creek	50	50
Woodford Creek	90	10
Cow Creek (West Fork Cow Creek to Quines Creek)	95	5
Dads Creek	50	50

Windy Creek is predominantly under non federal management along its entire course. BLM manages very little of the creek and mostly order 2 and 3 reaches in the upper basin.

Wood Creek is predominantly under non federal management which is comprises all the the water bearing creek sections during the summer flows.

Fortune Branch mainstem is under federal management about 1 mile upstream of its confluence with Cow Creek. Temperature monitoring sites above the property boundary indicate that this listing from headwaters to the mouth is unwarranted. The temperature monitoring site lowest in

the basin (FORT) has been ponded in the past, perhaps allowing for significant heating due to solar radiation.

Quines Creek above the federal property line in section 1 Township 32S Range 5W (QUI4 and QUI5) indicate good quality water. The Quines Creek crossing in Section 2 (QUI3) indicates elevated water temperatures. This one plus mile of stream segment flows through non federal lands that are under agricultural use.

Riffle Creek flows primarily through private timber lands along its course. The upper section of about ¾ of a mile is under federal control. Temperature monitoring sites above private ownership indicate the water quality is good. A ¾ mile stretch below (RIF4 and RIF5) is devoid of riparian vegetation due to past logging.

Skull Creek is managed by federal and non federal entities in approximately the same proportion. (SKL3 and SKL4) near the upper portion of Skull creek coming off of federal land is of good quality. The mile section below these sites has poor riparian cover.

Woodford Creek is mostly managed by non federal land owners. Agricultural and timber management account for the lack of riparian vegetation along the creek.

Cow Creek mainstem from West Fork Cow Creek upstream to Quines Creek is primarily under non federal management. Flow augmentation from Galesville Reservoir during summer months reduces water temperatures somewhat. The stream segment between Glendale upstream to Quines Creek is surrounded by agricultural activities in and along the flood plain.

Dads Creek is managed by both federal and non federal entities in approximate equal portions. Placer mining, timber harvest and frequent low flow conditions all contribute to elevated water temperatures in this creek. The checkerboard ownership pattern in this basin greatly influences the water temperature conditions.

It is felt that there is little that BLM could contribute to reducing water temperatures on most of the above listed streams due to ownership and the juxtaposition of BLM lands to the confluence of the smaller streams and Cow Creek. BLM lands are for the most part well vegetated and are in the higher portions of the streams.

There are several conditions within the Middle Cow Creek watershed that would explain the higher percentage of water quality limited miles on non-federal lands. BLM lands are higher in the watershed, and contain many 1st through 3rd order streams. These streams are steep and narrow and are fed by ground water sources which are naturally cool. Due to the small width of these channels, overhanging brush and smaller trees provide adequate shading. Lower elevation 4th through 6th order streams have lower gradients and are wider. These streams are primarily on non-federal land. Larger trees are required to adequately shade these streams, but due to logging practices and other agricultural pursuits, including grazing, most of the riparian vegetation and the width of riparian zones has diminished and do not provide streamshade. The east/west orientation of the Middle Cow Creek watershed also exposes the waters to greater solar heating during the day. Non-federal timber lands are managed according to Oregon Forest Practices Act

guidelines that do not provide the same degree of shade retention along streams as the ACS. Geology and soils of this watershed do not allow for a great degree of water storage. Uplands are steep and soils are relatively shallow. Recharge of streams by ground water is very limited during summer months. Summer water flow is now regulated by Galesville Reservoir.

Temperature

Maximum summer water temperatures in Middle Cow Creek watershed have probably always exceeded the current DEQ standard because its width, low gradient, and east/west orientation create a condition that allows for maximum absorptions of solar radiation throughout the day. In addition, bedrock, which is a major component of the substrate, absorbs heat during the day and radiates it to the stream at night. But natural factors alone do not appear to be limiting stream productivity.

There are many factors that may contribute to elevated temperature in these streams. In many cases there is more than one factor operating on stream and may include:

- Several tributary streams have segments that have no surface flow during summer periods;
- Low summer discharge (1.0 cfs, from USGS gage records nr Azalea.) gage was located about 3 miles upstream of I-5
- Riparian cover is absent or reduced due to agricultural practices adjacent to streams; past salvage logging within riparian zones; logging has removed shade over streams;
- Wide streams and stream orientation allow for direct solar heating;
- Wide, shallow gravel/bedrock channels;
- Relatively low gradient channels result in slower velocities therefore longer water retention time; and
- High percentage of roads in or adjacent to riparian zones.
- Many of the larger tributaries to Cow Creek are on non-federal land and both Oregon Senate Bill 1010 (SB 1010) governing agricultural Water Quality ad_____. Oregon Forest Practices Act (OFPA) regulations regarding management activities in riparian areas are less restrictive than those of the Northwest Forest Plan and BLM's RMP;
- Instream diversions for irrigation, pushup dams and pumping;
- Gravel operations;
- Placer mining.

Stream channel widths on 1st through 4th tributary streams are narrow enough for stream-side vegetation to provide adequate shade. The stream side vegetation consists of brush, hardwood and conifer species. However, canopy closure over many 5th order and above fish-bearing streams inadequate to maintain water temperatures when riparian zones are subjected to timber harvest, land clearing and water diversion. Water in Middle Cow Creek has been regulated by Galesville Reservoir sine 1985. Water diversions in the Middle Cow Creek watershed and nearly all its tributaries limit the amount of water available for fish and other aquatic species.

Stream Flow

The lowest 7-day low flows for the U.S. Geological Survey gage at Cow Creek Azalea (located about 3 miles upstream of I-5) for the period record of 71 years was 1.0 cfs. (Map 1). Low flows generally reflect annual precipitation levels with higher low flows in wetter years and lower summer flows in drier years. Variation in low flow from year to year is typical for this stream system. Historic data for the gaging station is available at web site address: http://www.wrd.state.or.us/cgi-bin/choose-gage.pl Gaging station data is not included in this document due to volume of data on that web site.

Disturbance of the riparian area and stream channel from wildfires and floods can also lead to increases in summer stream temperatures. These disturbances are considered part of the natural processes, and are expected change agents considered by the ACS (FEMAT, 1993). Middle Cow Creek Watershed has a frequent fire history with return intervals averaging 30 to 50 years on ponderosa pine dominated areas to over 50 years in more moist aspects and higher elevations. Recovery of riparian vegetation in areas disturbed by fire and flood will most likely experience fire and floods again in the future. The gain and loss of riparian vegetation by natural processes will fluctuate within the range of natural variability for this watershed and is outside the scope of this assessment. This Water Quality Restoration Plan (WQRP) focuses on areas where BLM management activities may exacerbate natural disturbance and result in impacts to water quality and quantity.

Factors Affecting Stream Temperature

The Middle Cow Creek Water Quality Restoration Plan addresses stream shade, changes in channel form, and flow as the three management factors that may contribute to water temperature problems.

There are many interrelationships between riparian /floodplain vegetation, summer stream temperatures, sediment storage and routing and the complexity of habitats in the Middle Cow Creek Watershed. It should be mentioned here that large mature conifers or hardwoods would likely continue to be rare on private lands, particularly agricultural lands, within the watershed unless major changes in land uses or land use regulations occur (OFPA and SB 1010). This translates to a continuance of unrecovered conditions on private lands, largely due to agricultural activities. These low gradient areas have high biological potential for salmon as “grubstake habitat” (Frissell 1993). In addition, recovery of large tree components on upstream public lands will not greatly benefit these habitats on private lands if these large tree lengths are not allowed to remain in the stream channel on private lands. An exception will be an anticipated decrease in sediment. Reduce runoff from upslope and upstream areas and the consequent affect of reduced sedimentation may benefit downstream aquatic and riparian habitats on private lands.

Temperature Factor 1. - Stream Shade

For the listed parameter, i.e., stream temperature, the beneficial uses affected are: resident fish and aquatic life and salmonid fish spawning and rearing. The state standard for Middle Cow Creek watershed requires that the seven (7) day moving average of the daily maximum shall not exceed 64 degrees Fahrenheit. A stream is listed as water quality limited when the rolling seven (7) day maximum average exceeds the standard.

Stream temperature is driven by the interaction of many variables. Energy exchange may involve radiation, longwave radiation, evaporative heat transfer, conduction and advection (e.g., Lee 1980, Beschta 1984). While interaction of these variables is complex, certain variables have a greater affect than others (Beschta 1987). For a stream with a given surface area and stream flow, any increase in the amount of heat entering a stream from solar radiation will have a proportional increase in stream temperature. Solar radiation is the singularly most important radiant energy source for the heating of streams during daytime conditions (Beschta 1997).

Without riparian shade trees, most incoming solar energy would be available to heat the stream. Riparian vegetation can effectively reduce the total daily solar heat load. The stream shade assessment determined where the stream shade has been reduced by management activities and placer mining and calculated the resulting increase in total daily solar heat loading. To determine where shade problems exist and the magnitude of the problem, the stream network of Middle Cow Creek was broken down into sections consisting of the main stem and its tributaries. Management activities such as harvesting trees in the riparian area can increase the amount of solar radiation entering a stream similarly increased bedload sediment that results in increases in the stream's surface area can also lead to increases in solar radiation. Water withdrawals during summer months (Jun-Aug) may exacerbate maximum temperatures.

The BLM monitored several 303(d) listed streams during the summers of 1998 and 1999 to determine which portion of the streams are water quality limited. Definitive information on where stream temperatures meet the standard on stream reaches have not been analyzed. It will take several years of monitoring to determine the reaches that have temperature limiting problems.

Temperature Factor 2. - Channel Form

Changes in bedload that alter channel morphology result from sediment input that exceeds transport capability of the stream. Sediment deposition can result in channel filling, thereby increasing the width-depth ratio. An increase in channel width can increase the amount of solar radiation entering a stream. A wide, shallow stream will heat up faster than a narrow, deeper stream with the same discharge. Input of sediments associated with storm events, and management-related sources of sedimentation can increase sediment over natural background and contribute to channel widening and subsequent stream temperature increases.

Temperature Factor 3. Flow

The temperature change produced by a given amount of heat is inversely proportional to the volume of water heated or, in other words, the discharge of the stream. A stream with less flow will heat up faster than a stream with more flow given all other channel and riparian characteristics are the same.

Routing of surface and subsurface waters via interception by road cuts has resulting in more rapid runoff during storm events and has precluded infiltration and subsequent slower release of stored water.

The flood plain in Middle Cow Creek Watershed has developed upstream of constricted rocky canyons downstream of Glendale. The flat areas of deposition are currently the places where small communities exist (Azalea and Quines Creek). Most of the residences and lands surrounding these communities are situated on or adjacent to the flood plain. Cattle grazing and other human activities will restrict the input of large wood and natural channel migration on private land. Ground water storage will likely remain below potential as a result, since flood waters would seldom spread out and store within the flood plain.

Element 4: Goals & Objectives

Temperature Findings

Assessing the impact of BLM management on temperature will be based on shade and channel form. The BLM's goal is to contribute to reduction of stream temperature shade recovery on areas of historic timber harvest are expected to take approximately 30 years after harvest to recuperate on the smaller tributaries on BLM lands. This is based on current age class of harvest units adjacent to streams on BLM lands taken from operations inventories (see Table 9). Riparian zones on larger tributaries and mainstem Middle Cow Creek may take considerably longer (100 years) to recover. See Appendix D of Appendix 1 of this document to determine anticipated time of recovery. This is based on time to maturity of conifer growth potential.

Table 9. Acres of Riparian Reserve by age class on Medford BLM lands Middle Cow Creek Watershed. HUC 6 2/99 data from GIS.

Age Class	HUC 6						
	Starveout	Quines	Fortune	Windy	McCullough	Dad=s	Riffle
Non Forest	79	62	14	5	4	87	21
0-10 years	528	453	114	122	260	212	165
11-20	532	256	274	23	160	219	96

Age Class	HUC 6						
	Starveout	**Quines**	**Fortune**	**Windy**	**McCullough**	**Dad=s**	**Riffle**
21-30	323	177	142	83	12	122	183
31-40	533	271	82	11	142	289	383
41-50	301	114	93	100	173	0	49
51-60	303	47	181	100	7	0	0
61-70	621	27	104	17	148	3	22
71-80	124	26	152	311	100	139	8
81-200 yrs.	1,076	1,141	292	481	326	1,011	1,207
201+	730	564	91	181	188	1,012	1,122
81+ Modified	689	303	338	19	205	149	380
Total Acres:	**5,839**	**3,441**	**1,877**	**1,453**	**1,725**	**3,243**	**3,636**

However, an assumption was made that smaller order streams $6^{th}/7^{th}$ field would be shaded by brush, hardwood and conifer species at an earlier age than the larger order streams. Most of the smaller order streams are hillslope constrained and narrow. When the data in Table 9 are compared to the data presented for Federally-administered lands (Appendix 1) there was found to be a very strong correlation between modeled existing shade percentage and percentage of seral stages over 30 years of age. The recovery period in the shade assessment in Appendix 1 is based on site potential and time required to reach maturity for conifer species and disregards hardwoods and brush species.

All recovery goals and plans are linked to maintaining ecosystem components currently functioning, and improving those sites that show the greatest potential for recovery. This approach will maximize recovery while minimizing expensive, extensive and risky treatments.

The objective of this plan is to eventually meet water quality standards through appropriate management practices. Anthropogenic causes of water quality degradation within this watershed will receive the majority of effort through time for restoration activities. Those standards, when met, will protect the beneficial uses identified for the Umpqua Basin under the Oregon Administrative Rules (OAR) 340-41-362.

The recovery of water temperature conditions in the Middle Cow Creek basin on federal lands will be dependent upon implementation of the BLM Medford District Resource Management Plan (RMP). Paramount to recovery is adherence to the Standard and Guidelines of the NFP to

meet the ACS. This includes protection of riparian areas as reserves and may include some silvicultural work to reach vegetative potential as rapidly as possible.

Table 10. Goals for Federal Lands

Element	***Goal***	***Passive restoration***	**Active Restoration**
Temperature Shade Component	Achieve coolest water temperatures possible through achievement of shaded riparian reserves.	Allow vegetation to grow naturally in riparian reserves as described in the NFP Aquatic Conservation Strategy	Silvicultural projects designed to promote achievement of site potential hardwood and conifers in a more rapid manner.
Temperature Channel Form Component	Maintain channel configuration of 1st through 4th order streams on BLM lands which are currently hydrologically properly functioning at this point.	Allow natural hydrologic processes to occur within the riparian reserves. Follow standards and guidelines of NFP Aquatic Conservation Strategy	Maintain roads to reduce sediment delivery to streams. Install drainage structures capable of passing 100 year flood events. Decommission roads to minimize potential sediment sources.
Temperature Stream Flow Component	Maintain natural flow conditions. Maintain flow needed for aquatic life.	Minimize consumptive use in management of BLM lands	Work with state Watermaster to identify unauthorized diversions. Reduce road densities by decommissioning roads which are no longer needed for management.

The shade model ran by DEQ utilized 1995 black and white and 1999 color aerial photos. It is believed that some canopy closure has occurred since 1999 and therefore more shade is already on streams than is indicated in the TMDL portion of DEQ Water Quality Management Plan. BLM does not intend to implement items in that are not mentioned in table 10.

Element 5: Timeline for Implementation and Attainment

It is difficult to set an exact recovery time for channel form when the recovery process is storm dependent. There is still active placer mining taking place within the basin so channel condition and storage of ground water surrounding these sites will likely slow recovery of the system.

The goal of the Clean Water Act and associated Oregon Administrative Rules (OARs) is that water quality standards shall be met or that all feasible steps will be taken towards achieving the highest quality water attainable. This is a long-term goal in many watersheds, particularly where non-point sources are the main concern.

DEQ recognizes that TMDLs are values calculated from mathematical models and other analytical techniques designed to simulate and/or predict very complex physical, chemical and biological processes. Models and techniques are simplifications of complex processes, and, as such, are unlikely to produce an exact prediction of how stream surveys will respond to the application of various management measures.

WQMPs are plans designed to reduce pollutant loads to meet TMDLs. DEQ recognizes that it may take several decades – after full implementation before management practices identified in a WQMP become fully effective in reducing and controlling pollution. In addition, DEQ recognizes that technology for controlling nonpoint source pollution is, in many cases, in the development stages and will likely take one or more iterations to develop effective techniques. It is possible that after application of all reasonable best management practices, some TMDLs or their associated surrogates cannot be achieved as originally established.

DEQ also recognizes that despite the best and most sincere efforts, natural events beyond the control of humans may interfere with or delay attainment of the TMDL and/or its associated surrogates. Such events could be, but are not limited to, floods, fire, insect infestations, and drought.

The WQRP will address how human activities will be managed. It recognized that full attainment of target load reduction at all locations may not be feasible due to physical, legal or other regulatory constraints. To the extent possible, NFP identifies potential constraints, and provides the ability to mitigate those constraints should the opportunity arise.

Where nonpoint sources are given a zero load allocation, it does not necessarily mean that human-related activities on the land are prohibited or that human activity must be removed from riparian or other areas that might impact water quality. It does mean that anthropogenic activities that might increase heat discharge to the water body must be managed to prevent, to the maximum practicable extent, further warming. Specified management will allow riparian vegetative communities to grow and propagate, and natural fluvial processes such a flood plain formation and bank stabilization to occur.

In employing an adaptive management approach BLM understands DEQ expectations:

- the progress of the TMDLs and the WQMP on a five year basis
- evaluate the progress towards achieving the TMDLs
- Designated Management Agency (DMA) will monitor and document its progress in implementing the provisions of its WQRP implementation plan

- that DMAs will develop benchmarks for attainment which can be used to measure progress; for management agencies to revise the components of their WQRPs to address deficiencies
- to consult with DMAs on attainment of water quality standards, and revise it as appropriate.

Stream shade recovery will be realized more quickly than habitat recovery with the growth of hardwoods, e.g., alder, maple, ash and cottonwood. Habitat recovery and associated sediment storage/routing in the channel will only recover to an optimum range of conditions with the recovery of riparian conifers to mature size. This will afford some added shade as these trees reach more height. Lower summer water temperatures and creation of quality habitat conditions for trout and salmon are anticipated with maturation of riparian forests in these watersheds, addressing road-related problems in the watershed, and reduced timber harvest under the NFP. Harvest related slope failure issues will be addressed through the adaptive management measures within the NFP.

BLM proposes to accomplish reduction or maintenance of stream temperature through the following during the immediate and near future:
Renovate roads (outslope, gravel surface, water dip)
Use grants and other sources to fund road restoration projects
Make emergency repairs as problems are discovered
Maintain the BLM road network according to the State BLM Transportation Management Plan
Utilize passive restoration such as protecting Riparian Zones so that natural recovery is realized.

Restoration Prioritization and Funding

Funding for instream restoration will likely be very limited for BLM. Activity plans include decommissioning of roads, road renovation projects and possible density management projects.

Much of the restoration activity that may occur will likely be funded indirectly through projects (timber sales and silvicultural projects). Other funding sources would be utilized on a project by project basis depending on the criteria set forth in the funding source.

As part of the Clean Water Action Plan, Oregon has begun an interagency effort that identifies high priority watersheds in need of restoration and protection as part of the Unified Watershed Assessment. It is possible that funding associated with the Clean Water Action Plan could be accessed to carry out protection and restoration actions in the Middle Cow Creek Watershed.

Element 6: Responsible Parties

Federal Lands - Participants in this plan for lands include DEQ and BLM. The BLM is the only federal land manager in this watershed and is responsible for completion and implementation of the WQRP for federal lands.

Nonfederal Lands - A subsequent WQMP for the remainder of the watershed is expected to be developed by DEQ and other Oregon Departments responsible for lands within this watershed.

That WQMP will deal with state and local government lands as well as private lands, including private forest lands within the Middle Cow Creek Watershed.

The Oregon Department of Forestry (ODF) is the Designated Management Agency (DMA) for regulation of water quality on nonfederal forest lands. The Oregon Board of Forestry in consultation and with the participation and support of DEQ has adopted water protection rules in the form of BMP's for forest operation. These rules are implemented and enforced by ODF and monitored to assure their effectiveness. ODF and DEQ will jointly demonstrate how the Oregon Forest Practices Act, forest protection rules (including the rule amendment process) and Best Management Practices (BMPs) are adequate protection for water quality.

Oregon Water Resources Division (WRD) is a participant within the implementation and monitoring components of this plan. WRD will be doing flow measurements, and will also assist in identifying opportunities for converting consumptive uses to instream rights.

The Oregon Department of Geology and Mineral Industries (DOGAMI) is also a participant with respect to mining impact assessment and permit modifications. DOGAMI covers mining operations that exceed one (1) acre of disturbance or 5000 cubic yards of production within a 12-month period. Operators are required to obtain an operating permit if they are located above the 2-year floodplain of creeks and rivers.

Oregon Department of Agriculture via statute of SB 1010 which established Soil and Water Conservation Districts has jurisdiction over grazing and other farming activities. Active outreach to local farmers and ranchers will continue to occur helping to ensure water quality standards are realized.

Element 7: Reasonable Assurance of Implementation

The following table lists instream and other improvements for restoration of watershed function and water quality.

Table 11. Past Middle Cow Creek Watershed Improvement Projects

Watershed Improvement Projects Glendale Resource Area, Medford District, BLM			
Project Name	**Year completed**	**Miles of Road Improved or Stream Improved**	***Fish Species Benefitted**
Replace Fortune Branch Creek culvert #4, 32 S., R. 5 W., Sec 9 (fish passage; undersize)	1996	3.0/0.2/1.5	CO, ST, CT
Replace Fortune Branch Creek culvert #3, T. 32 S., R. 5 W., Sec 17 NE (fish passage; undersized)	1996	1.8/1.2/2.7	CO, ST, CT

Replace Fortune Branch Creek culvert on road 32-5-20 (fish passage) (#2)	1997	1.0/2.0/3.5	CO, ST, CT
Repair Riffle Creek Road washout T. 32 S., R. 8 W., Sec 27 SW	1996	0.1	CO, ST, CT
Repair Bonnie Creek Road 32-8-35.2 (Riffle Creek) add cross drains T. 32 S., R. 8 W., Sec. 35 T. 33 S., R. 8 W., Sec. 2, 3	1996	2.0	CT
Rueben Road repair T. 33 S., R. 7 W., Secs. 3, 4, 9 (Cow Creek) cross drains, rocking	1995	2.0	CO, ST, CT
Repair Woodford Creek Road T. 32 S., R. 5 W., Sec. 33 SW Replace plugged culvert	1995	0.1	CO, ST, CT
Replace Skull Creek culvert w/Conspan T. 32 S., R 7 W., Sec. 19 (fish passage)	1996	$80,000 0.1/1.4/2.2	CO, ST, CT
Replace Bonnie Creek Culvert T32S R8W Sec 5 NENE	1997	1.0/-/5.2	CT
Perkins Creek Road Slide Repair T32S R7W Sec9 NW1/4	1998	0.1	CT
Cow Creek Road Rehab Drainage Improvement - 4 roads (misc) 31-3-19.0: 0.94 (UC) 31-4-25.3: 0.48(UC) 31-3-31.0: 2.32(UC) 32-5-7.1: 0.55(MC)	1999	4.29 Total: $57,500	CO, ST, CT
Decommissioning - 4 roads. (misc) 31-3-19.2: 0.17(UC) 32-4-23.0: 0.44(MC) 31-4-24.0: 0.28(UC) 32-5-9.3: 0.24 (MC)	1999	1.13	CO, ST, CT
Improve drainage on Susan Creek Road - new and additional culverts, armored water dips (Structures Replacement Contract) (T33S R7W)	1999	5.0	CO, ST, CT
Drainage Improvement on road #32-5-33.3 (MC)	2000	0.52	

Stevens Creek and Rattlesnake Road Culvert replacement 33-7-2.2 (MC) 33-7-2.2 and 33-7-2.1 (MC) Murphy Road Drainage Improvement	2000 2000	 0.59 3.44 2.68 Total Cost: $50,957	
Decommission roads in Middle Cow 32-5-27 0.3 32-5-33 0.35 32-5-33.1 0.6 33-5-5 0.16	2000	1.41	
Murphy Road Drainage Improvement (#32-5-22)	2000	2.68	
Dads Creek Fish Passage (2 culverts) 32-7-15 NESE and 32-7-15 SENE Renovate RR roads in Dads Creek 32-7-21 2.3 32-7-21.1 0.75 32-7-15.1 0.79 32-7-15.3 0.6	2001 2001	 4.44 Total Cost: $93,442	
Dollar Skull Road Renovation. (#32-8-36) using CWWR $$ (Clean Water Act funding - 1040)	2001	3.0 Cost: $20,000	
Blackhorse Creek Fish Passage (3 culverts) Partner with Seneca. 1 fish; 2 non-fish	2002	BLM CCS for $8000. Seneca and Silver Butte contribute the remainder. OWEB denied funding 2001 and 2002	
#31-4-34.2 Road decom 0.41 miles # 32-4-21.1 Pull culvert	2002	Part of a contract that includes several Grave Creek roads	
Fizzleout Cr culvert replacement (fish passage) JITW. Also is rusted out and undersized	2003-2004	0.9	Co, st, ct

The following standards and guidelines from the NFP will be used to attain the goals of the Middle Cow Creek Water Quality Restoration Plan:

Stream Temperature – Shade

Aquatic Conservation Strategy: B-9 to B-11, C-30 (denotes section and page # of NFP)
Standard and Guidelines for Key Watersheds: C-7
Riparian Vegetation: B-31
Riparian Reserves: B-12 to B-17 and ROD 9
Watershed Restoration: B-30

Stream Temperature - Channel Form

Aquatic Conservation Strategy: B-9 to B-11, C-30
Standard and Guidelines for Key Watersheds: C-7
Riparian Vegetation: B-31
Riparian Reserves: B-12 to B-17 and ROD 9
Watershed Restoration: B
Roads: B-19, B-31 to B-33

BLM is currently upgrading its transportation objectives within each watershed. Part of the plan is to identify roads that need surfacing, pipe replacement or that could be decommissioned. All the sub-watersheds have high road densities and all are above the two miles per square mile target established by the National Marine Fisheries Service for proper functioning condition. Above 3 miles per square mile is considered not functioning properly by NMFS. Road densities would be decreased where possible.

Aside from elements covered under this heading, there is a general idea that restrictions within the Forest Plan have greatly contributed to reducing impacts on the aquatic system. These include, but are not limited to, wide riparian buffers on all streams, including intermittent channels; green-tree retention on harvest units; restrictions on new road construction and requirements for 100 year flood capacity for road crossing structures. Best management practices that were designed for implementation under the NFP would help reduce impacts and in some cases, actually restore conditions to “Properly Functioning”.

BLM has followed the standards and guidelines of the NFP aquatic conservation strategy and will continue to do so. Until the Plan is revised or replaced BLM is responsible for implementation of the Plan.

Temperature - Shade Component

It is unlikely that over the next few years that the Glendale Resource Area will prescribe riparian stand treatments in stands located adjacent to perennially flowing water (active restoration). Precommercial thinning (PCT) may occur in conjunction with normal stand maintenance in units having a stream flowing through or adjacent to them. BLM will continue to adhere to the ACS of the NFP by providing riparian reserves along streams.

Temperature - Channel Form Component

Through management activities such as timber sales, Jobs-in-the-Woods projects, Title II and routine maintenance, BLM will endeavor to reduce road generated sediment. Monitoring of actions will take place periodically to ensure desired reduction of sediment is achieved.

Temperature – Flow

BLM will continue to maintain or improve flow conditions on federal lands. Passive management will be stressed as there are no current identified opportunities for flow augmentation within the federal managed lands of this basin.

Element 8: Monitoring/Evaluation Plan

Assessing Potential for Recovery - Properly Functioning Condition Methodology

Recovery of riparian areas, stream channels, and aquatic habitat requires a base condition with adequate vegetation, channel form, and large woody debris to dissipate stream energy associated with high water flows. The BLM/USFS methodology known as Properly Functioning Condition (PFC) assesses the capability of streams to withstand 30-year interval storm events. This quick, interdisciplinary method is the first step in determining the feasibility of restoration and recovery (Riparian Area Management TR 1737-15 1998).

BLM will continue to monitor stream temperatures at selected sites in cooperation with DEQ and the Umpqua Basin Watershed Council.

Assessing Potential for recovery – ODFW Methodology

Restoration in Middle Cow Creek watershed will be both active and passive. Growth of vegetation on floodplains is integral to recovery. The overall goal is to move the attributes considered in this assessment; pool/riffle ratio, pool frequency, large wood, and riparian forest conditions from the present “poor” and “fair” ratings to “good” and “fair”, per ODFW benchmarks. These attributes are used to measure if and when the stream is nearing its biological potential for supporting dependent aquatic and riparian species, including anadromous fish. Natural variation will cause changes in stream and floodplain conditions and make allowance for some attributes as being rated “fair”. These attributes and benchmarks should be validated with subsequent inventory and monitoring work in the watershed, refining them to suit the range of conditions expected in the watershed as we learn more.

Monitoring will provide information as to whether standards and guidelines are being followed, and if actions prescribed in the WQRP are achieving the desired results. In addition to the monitoring identified in the WQRP, RMP/Forest Plan monitoring occurs annually to assess implementation of standards and guidelines. Information obtained from both sources of monitoring will ascertain whether management actions need to be changed. Continued monitoring would be prioritized upon review of findings.

The monitoring plan itself will not remain static and will be periodically adjusted, as appropriate; to assure the monitoring remains relevant. See Table 12.

Temperature

The BLM, with cooperators, will continue to monitor stream temperatures throughout Middle Cow Creek. We monitor to meet a variety of objectives, so site locations will vary over time. Monitoring activities for BLM will try to determine the source area of temperature increase within reaches of streams that are listed for temperature. Through monitoring, BLM's goal is to determine the upper extent of the problem area and delist the reaches or streams that through time meet the water quality standard for temperature. Our objectives are to monitor long-term temperature recovery, better understand the natural temperature variability, and to track potential project effects. There are several locations that are monitored annually during the summer months to establish temperature ranges within the basin.

Table 12. Interim Benchmarks and monitoring strategy for Middle Cow Creek

Element	**Management measure**	**Interim benchmark**	**Monitoring parameter**	**Monitoring frequency**
Temperature Shade component	Passive treatment of riparian vegetation. Implement standards and guides of NWFP. Some PCT may occur in conjunction with units that have streams flowing through or adjacent to them.	Allow stands to grow toward shade target.	Shade, canopy closure over stream focusing first on hardwood species.	Review of selected reaches every 5 to 10 years using aerial photos, field check condition of riparian vegetation. Within one year complete PFC surveys for selected streams within basin.
Temperature Channel form component	Maintain integrity of streams channels on land under BLM control.	Assess roads and culvert conditions within the watershed within the next 2 years.	Sedimentation resulting from roads by miles of road surfaced or decommissioned.	Review yearly miles of road decommissioned, renovated or maintained.
Temperature Flow component	Road management objectives	Yearly evaluation	Proper drainage and routing	Miles of road decommissioned, out sloped, rocked, number of culverts replaced.

Element 9: Public Participation Plan

This WQRP is a procedural step that focuses on water quality using elements of the NFP. Watershed analyses are a recommended component of the ACS under the NFP and RMP. The Record of Decision (ROD) for the RMP was signed in June of 1995, following extensive public review.

Public involvement was integrated into the development of the Middle Cow Creek Watershed Analysis. Public meetings were held in Glendale several times during the analysis process. Public involvement for the WQRP will be coordinated by DEQ in conjunction with the effort addressing state, county and private lands within this watershed. Umpqua Basin Watershed Council has coordinated with and used BLM data and expertise in preparation of their own watershed assessment.

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Appendix 1. Weighted stream shade and recovery time

Middle Cow Creek	Stream Reach Identification	Stream length (f t)	Vegetation Class Species (DEQ Code)	Height in Riparian (ft.)	Age (yrs.-d/c)	% Shade BLM Existing	% Shade BLM Potential	Years to Recovery (yrs.-d/c)	
Middle Cow									
subsection of									
Middle Cow									
	mc113e	247	551	40	15/20	30	70	25/35	
	mc113w	247	302	2	n/a	75	75	0	
	mc114e	106	302	2	n/a	75	75	0	
	mc114w	106	551	40	15/20	30	70	25/35	
	mc115e	116	521	40	15/20	50	70	25/35	
	mc115w	116	551	40	15/20	30	70	25/35	
	mc116e	168	521	40	15/20	50	70	25/35	
	mc116w	168	700	90	55	75	75	0	
	mc117e	179	551	40	15/20	30	70	25/35	
	mc117w	179	500	70	40/40	70	70	0/16	
	mc118e	189	521	40	15/20	50	70	25/35	
	mc118w	189	500	70	40/40	70	70	0/16	
	mc119e	288	550	70	40/40	30	70	0/16	
	mc119w	288	500	70	40/40	70	70	0/16	
	mc120e	145	700	90	55	75	75	0/16	
	mc120w	145	750	90	55	40	75	0	
	mc121e	165	700	90	55	75	75	0	
	mc121w	165	700	90	55	75	75	0	
	mc122e	129	520	70	40/40	50	70	0/16	
	mc122w	129	701	50	25	75	75	30	
	mc123e	220	551	40	15/20	30	70	25/35	
	mc123w	220	701	50	25	75	75	30	
	mc124e	298	551	40	15/20	30	70	25/35	
	mc124w	298	500	70	40/40	70	70	0/16	
	mc125e	242	551	40	15/20	30	70	25/35	
	mc125w	242	701	50	25	75	75	30	
	mc126e	219	701	50	25	75	75	30	
	mc126w	219	700	90	55	75	75	0	
	mc127e	391	701	50	25	75	75	30	
	mc127w	391	700	90	55	75	75	0	
	mc128e	474	520	70	40/40	50	70	0/16	
	mc128w	474	700	90	55	75	75	0	
	mc129e	433	521	40	15/20	50	70	25/35	
	mc129w	433	700	90	55	75	75	0	
	mc130e	216	551	40	15/20	30	70	25/35	
	mc130w	263	700	90	55	75	75	0	

Middle Cow Creek	Stream Reach Identification	Stream length (f t)	Vegetation Class Species (DEQ Code)	Height in Riparian (ft.)	Age (yrs.-d/c)	% Shade BLM Existing	Potential	Years to Recovery (yrs.-d/c)
subsection of								
Middle Cow								
	mc131w	263	700	90	55	75	75	0
	mc132e	150	551	40	15/20	30	70	25/35
	mc132w	150	700	90	55	75	75	0
	mc133e	157	521	40	15/20	50	70	25/35
	mc133w	157	700	90	55	75	75	0
	mc134e	333	751	50	25	40	75	30
	mc134w	333	701	50	25	75	75	30
	mc135e	286	551	40	15/20	30	70	25/35
	mc135w	286	701	50	25	75	75	30
	mc136e	149	521	40	15/20	50	70	25/35
	mc136w	149	700	90	55	75	75	0
	mc137e	284	521	40	15/20	50	70	25/35
	mc137w	284	700	90	55	75	75	0
	mc138e	982	521	40	15/20	50	70	25/35
	mc138w	982	700	90	55	75	75	0
	mc139e	670	521	40	15/20	50	70	25/35
	mc139w	670	700	90	55	75	75	0
	mc140e	545	521	40	15/20	50	70	25/35
	mc140w	545	700	90	55	75	75	0
	mc141e	696	521	40	15/20	50	70	25/35
	mc141w	696	700	90	55	75	75	0
	mc142e	899	751	50	25	40	75	30
	mc142w	899	700	90	55	75	75	0
	mc143e	144	751	50	25	40	75	30
	mc143w	144	700	90	55	75	75	0
	mc144e	1440	751	50	25	40	75	30
	mc144w	1440	700	90	55	75	75	0
	mc145e	529	700	90	55	75	75	0
	mc145w	529	700	90	55	75	75	0
	mc146e	506	700	90	55	75	75	0
	mc146w	506	700	90	55	75	75	0
	mc147e	343	700	90	55	75	75	0
	mc147w	343	751	50	25	40	75	30
	mc148e	468	521	40	15/20	50	70	25/35
	mc148w	468	751	50	25	40	75	30
	mc149e	455	521	40	15/20	50	70	25/35
	mc149w	455	701	50	25	75	75	30
	mc150e	326	701	50	25	75	75	30
	mc150w	326	700	90	55	75	75	0
	mc151e	992	501	40	15/20	70	70	25/35
	mc151w	992	700	90	55	75	75	0
	mc152e	342	701	50	25	75	75	30
	mc152w	342	750	90	55	40	75	0
	mc153e	386	701	50	25	75	75	30
	mc153w	386	501	40	15/20	70	70	25/35

Middle Cow Creek	Stream Reach Identification	Stream length (f t)	Vegetation Class			% Shade		Years to Recovery (yrs.-d/c)
			Species (DEQ Code)	Height in Riparian (ft.)	Age (yrs.-d/c)	BLM Existing	Potential	
Middle Cow								
subsection of								
Middle Cow								
	mc154b	748	701	50	25	75	75	30
	mc155b	556	701	50	25	75	75	30
	mc156b	447	701	50	25	75	75	30
	mc157e	288	751	50	25	40	75	30
	mc157w	288	701	50	25	75	75	30
	mc158e	559	751	50	25	40	75	30
	mc158w	559	305	0	n/a	0	0	0
	mc159e	215	751	50	25	40	75	30
	mc159w	215	701	50	25	75	75	30
	mc160e	228	751	50	25	40	75	30
	mc160w	228	701	50	25	75	75	30
	mc161e	380	751	50	25	40	75	30
	mc161w	380	701	50	25	75	75	30
	mc162e	776	521	40	15/20	50	70	25/35
	mc162w	776	700	90	55	75	75	0
	mc163e	327	521	40	15/20	50	70	25/35
	mc163w	327	700	90	55	75	75	0
	mc164e	259	555	70	40/40	10	70	0/15
	mc164w	259	700	90	55	75	75	0
	mc165e	208	521	40	15/20	50	70	25/35
	mc165w	208	700	90	55	75	75	0
	mc166e	516	521	40	15/20	50	70	25/35
	mc166w	516	700	90	55	75	75	0

1. Average Potential Percent Shade value comes from averaging reach distances using the following shade values: 1.) If system potential is below 80% use the system potential value, 2.) If current vegetation is less than 80% and system is capable of achieving 80% or greater, 80% is used, 3.) If existing shade greater than 80% that value is used.

2. Average years to recovery is time estimated for percent effective shade to reach system potentials or 80%. If current shade is greater than 80% system is considered recovered and time to recovery is zero. Time to recovery is estimated as time from 2003 in the absence of natural disturbance.